## Wildland Fire Education and Outreach Case Studies

### National Park Labs: Studies of Wildland Fire Ecology High School Program Santa Monica Mountains National Recreation Area

Los Angeles and Ventura Counties, California, comprise one of the most racially and ethnically diverse communities in the country. Limited transportation, language barriers, and the enormous size of the area limits knowledge of and access to Santa Monica Mountains National Recreation Area. Classroom laboratories and in-park programs provide ideal tools for reaching underserved and diverse groups of students.

For more than six years, the park has had well-established elementary and middle-school programs that reach the community. Yet, high school students continue to be woefully underserved. For that reason, Santa Monica Mountains National Recreation Area staff applied for a grant from the National Park Foundation to support a program entitled *National Park Labs: Studies of Wildland Fire Ecology*. The program was funded in January 1998.

The goals of the program include increasing awareness of national park resources and stewardship, as well as understanding the role of fire in the environment. The grant provides ninth and tenth grade students, plus teachers, with practical curriculum-based scientific experiences; builds appreciation for park resources; and exposes students to career opportunities in resource management, science, math, and technology. The program is designed to meet National Science Teacher's Association (NSTA) standards and benchmarks.

Major partners involved include Los Angeles Unified School District; California Lutheran University; California State University Northridge; Ohio State University, Columbus, Ohio; University of California at Los Angeles; Los Angeles and Ventura County Fire Departments; California State Department of Education; California Geographic Alliance/National Geographic Society; Los Angeles County Office of Education; National Interagency Fire Center, Boise, Idaho; Santa Monica Mountains National Recreation Area (Fire Management, Resource Management, and Interpretation); U.S. Forest Service; and U.S. Geological Survey.

#### Management of the Program

Programs are limited to classes of teachers who attend workshops in advance. Workshops in secondary schools are more well-attended in the fall and spring. Workshops are conducted through California Lutheran University and staffed by instructors from Los Angeles Unified School District and the National Park Service. Once teachers have attended the workshop, they are eligible to check out fire ecology test equipment for use at their schools or in the park (field).

Using *Global Learning and Observation to Benefit the Environment* (GLOBE), teachers and students learn how to use accepted scientific protocols to measure and record weather, plant growth, soil, and other related data. Teachers and students also maintain field and laboratory notes and post them to the World Wide Web for universal use by scientists and other schools. Classes introduce Geographic Information Systems (GIS) and Global Positioning Systems (GPS).

This program meets the new integrated coordinated science curriculum being implemented locally and considered statewide and nationally for high school students in grades 9 and 10. Rather than using traditional isolated scientific approaches of biology, physical science, chemistry, physics, genetics, etc., this program integrates scientific concepts across disciplines and uses them in the various labs and core units developed for the fire ecology program.

## What Students Learn

Hands-on skills taught in the program include:

- Analysis of fire behavior
- Analysis of fire ecology
- Analysis of media and public perception
- Use of interactive CD-ROM for analysis and decision making

## Steps in Program Development and Consideration

A. Establish an advisory committee.
B. Collect curriculum materials.
C. Apply for grants.
D. Hire outside consultants.
E. Recruit volunteers and interns.
F. Use students who previously attended the program as mentors for new groups.
G. Recruit consultant for CD-ROM.
H. Select pilot schools and/or classes to test elements of the program.
I. Develop workshops to train teachers and staff and ensure confidence in the program equipment and materials.
J. Train staff in GLOBE through university or school district-contracted program.
K. Arrange with school district Eisenhower program and/or a local university for teacher workshop credit.
L. Advertise the teacher workshop(s).
M. Decide upon participant and control classes at the school (preferably the same teacher). Develop pre- and post-tests and compile data. Strive for determining cognitive growth and attitudinal change.
N. Allow extra time for implementation through the park and school district(s) bureaucracy.
O. Create a Memorandum of Understanding with your school district(s) and include a contract for payment of partner costs. (Know all the players.)
P. Arrange for school pre-visits to introduce and train students for field studies. (Pay attention to school calendars.)
Q. Develop and revise field guide drafts following each workshop. Incorporate teacher critiques and recommendations.
R. Test group classes should complete a minimum of three field visits to the park each year. Field programs should last a minimum of two hours per visit.
S. Subsequent visits should build on previous knowledge.
T. The staff should make a practice visit at the school within two weeks prior to the field visit.
U. Limit class size to less than 40 students.
V. Keep park, school officials, and other parties aware of your activities. Invite them to visit your programs.

## Budget

As with most grants, parks and partners share a minimum of 50 percent of the costs. Following expiration of the grant, the program is expected to be reproducible in other venues and supported by the grantee agency and its partners.

## National Park Labs: Studies of Wildland Fire Ecology Guide

The guide will be published, revised, and edited by December 2001. It will also be available via the internet at that time.

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## Fire Discovered at Big Thicket

Fire. The sound of the word quickly commands our attention. "Fire," the chemical process reaches into our instinctive nature—warmth, comfort, danger, and harm. Either way, we are restrained, to some degree, by fire. So much in our lives is based at some point on fire. From the production of electrical energy and petroleum products to nearly all the other products we use, somewhere along the production line, fire played a role.

The same is true of the unhampered, natural world. Fire plays a most significant role in the processes of life generation, growth, decay, and regeneration. We have witnessed many "energy releasing" events in our lifetimes—large wildland fires burning in the western United States and Canada. Other parts of the world are visited regularly by this energy-releasing event—Malaysia, Europe, Russia, and Australia to name just a few. Some of the areas burn more frequently than others. Yet, today, all of these areas have been affected by the human action of heavy fire suppression.

When Big Thicket National Preserve was established by Congress in 1974, there was a problem of not enough fire and an active recent history of heavy fire suppression. One element needed in the overall resources management process of this piece of southeast Texas was to reintroduce fire. Today, an active prescription fire program has been implemented allowing preserve resource staff to program for and burn thousands of acres of undergrowth each year to re–create what was the native Big Thicket.

By nature, humans are captivated by fire. With that simple fact, the Resources Education staff at the preserve working in concert with others has produced several interpretive and educational products. A short videotape designed for preserve neighbors and others with an interest in the prescription fire program was completed in the early 1990s. The video along with a site bulletin explains the program in simple terms as an effort to reestablish a natural process long missing and important to a healthier preserve environment.

A new interpretive "vehicle" was conceptualized, designed, built, and is now used by the preserve to address the complications and science of fire, both wild and prescription, in a non-complicated manner for the visitors. This "vehicle" is called the Discovery Station. A product of the National Park Service's Interpretive Design Center at Harpers Ferry, West Virginia, the Discovery Station at Big Thicket National Preserve is a wonderful educational addition to the program.

Using several interpretive eye-catching sections, i.e., two-dimensional panels, three-dimensional objects, electronic media including an interactive computer and audio elements, the station offers many opportunities to learn about fire on a broad scale. There are "take home" flyers for the user. The station is designed to be flexible. It offers the ability to address current information on prescription fire projects underway using video or the simple status board. Though the station is the prototype, it has been very successful.

Because of limited space and facilities in the preserve, the station is operational through a partnership with the Texas Forestry Museum nearby. With the completion of a new visitor center in the preserve, the station will return to the preserve for future uses. One can visit the Discovery Station at http://www.nps.gov/discover.

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## Public Awareness and Knowledge of Wildland Fire Through County Level Programming: A Florida Partnership Initiative

The Cooperative Extension Service of the University of Florida (School of Forest Resources and Conservation and Department of Wildlife Ecology and Conservation), the Florida Division of Forestry, and the Florida Chapter of The Nature Conservancy are partnering to raise public awareness of wildland fire. The project implemented in 1999 involves experts in wildland fire, forest management, wildlife ecology, communications, education, and evaluation in the development of a Fire Education Toolkit and a series of three Fire Education Inservice Training Programs. The Toolkit allows teams of extension agents and Division of Forestry representatives to develop public programs in their counties by offering a variety of fact sheets, brochures, videos, slide sets, roadside interpretation signs, neighborhood letters, and news releases. The county-level programs address topics such as:

- fire-dependent ecosystems in Florida;
- benefits to human population provided by fire-dependent ecosystems;
- the role of fire in the ecosystem and the effects of fire during and after burns;
- the use of prescribed burning to manage lands, and social problems associated with prescribed burning;
- the ecosystem effects and social risks caused by more people living in fire-prone natural areas; and
- actions residents can take to sustain these ecosystems and live safely in them.

The information is being delivered through public programs and local news media, and supplemented with interpretive signs at demonstration areas. By creating and training participants in an information dissemination network, this project makes a sustainable contribution to educating central and northern Floridians about wildland fire for years to come.

This partnership joins together program delivery and wildfire expertise. The Cooperative Extension Service consists of 67 county offices and state specialists dedicated to delivering scientific-based information to the citizenry. It is particularly effective in rural areas, where agriculture and forestry interests have been well served for a century. The Division of Forestry (DOF) in the Department of Agriculture and Consumer Services is the lead agency responsible for wildland fire management in Florida. The mission of the Division of Forestry is to protect and manage Florida's forest resources through a stewardship ethic to assure these resources will be available for future generations.

The Nature Conservancy, a lead partner, owns the largest private system of nature sanctuaries in the world. Each year, the Conservancy conducts about 300 prescribed burns across the United States. In Florida, the Conservancy owns and manages 37 preserves, totaling nearly 40,000 acres. The Nature Conservancy's Florida Chapter has used prescribed fire for more than a decade to restore and maintain natural areas in Florida.

This project has two main target audiences: (1) teams of County Extension Agents and Division of Forestry field representatives who are trained to deliver programs, and (2) adult residents of north and central Florida living in and near forested areas who will learn about fire from the county teams. This combination of audiences will establish an organized network of local contacts capable of delivering public education about fire for this grant cycle and in the future.

The overall goal of the project is to increase the awareness and knowledge of adult residents of Florida about the aforementioned fire topics, particularly residents who live in or near the wildland/

urban interface. Because the project has two components (educating and equipping county teams and then educating the public), there are two types of objectives: project objectives and behavioral objectives.

## Project Objectives

1. Measure current awareness and knowledge of target audience members about the specified fire topics through a needs assessment survey (including secondary data sources in the literature) to support the development of more effective educational materials and programs.
2. Create model educational media materials and obtain additional materials to form a Fire Education Toolkit.
3. Educate county teams in three training workshops to explain how to use the Toolkits to expand participants' knowledge of fire in Florida, and how to develop their own county programs.
4. Establish a prescribed fire demonstration area in Volusia County to enhance the training workshop and pilot-test educational materials and methods for effective use of demonstration burns.
5. Support county teams as they adapt the materials and conduct effective programs for the residents of their fire-prone regions.

## Behavioral Objectives

1. Ninety percent of the County Extension participants will increase their awareness and knowledge of specified wildland fire topics (we assume some Extension agents and the Division of Forestry staff are already aware and knowledgeable), and 100 percent of participants will indicate an intention to use the Fire Education Toolkit.
2. Seventy percent of the participating public will increase their awareness and knowledge regarding the specified fire topics and indicate an increased intention to perform actions to sustain fire-dependent ecosystems and to live safely within them.

## Product Descriptions

## Needs Assessment

Recognizing that the 1998 wildland fires may provide some residents with more knowledge or more fear, random phone interviews were conducted with 350 residents of counties with high 1998 wildland fire acreage and 350 residents of counties that did not experience the 1998 fires. This information was used to develop effective materials. A 1999 Extension Inservice Workshop on prescribed burning collected input for the Fire Education Toolkit materials and training program. A report of these assessments was completed in April 1999.

## Fire Education Toolkit

The Fire Education Toolkit includes newly developed educational materials and the best existing fire education materials. Materials were designed and selected by the cooperators to address the objectives and educational topics of the project. One hundred and fifty Toolkits are being produced and distributed to all County Extension and Division of Forestry offices in north and central Florida. The kit includes:

### *Toolkit Manual*

The Toolkit manual provides guidance on the use of the materials and an annotated guide to the video library, a suggested slide presentation script, guidelines for adapting the model press releases, guidelines for creating and using demonstration areas, suggestions for the best materials to use with different audiences, guidelines for planning public programs, and forms for keeping records of program activities.

### Video Library

A variety of useful videos exist on wildland fire in Florida. The library has "Where There's Fire" produced by Florida State Community's public television station (WFSU) and "Wildlife 101" in the Beyond Science series produced by University of South Florida's public television station.

### Slide Set

A set of slides (approximately 60) were collected from existing files owned by the cooperators or photographed to show how prescribed burns are conducted and what landscape changes are important to create defensible space.

### Educator's Guide

Designed for teachers by the Florida Division of Forestry, "Fire in Florida's Ecosystems," which includes an excellent introduction to wildland fire in Florida, is targeted to adult educators (i.e., county teams).

### Brochures and Fact Sheets

A variety of pamphlets, brochures, and fact sheets about fire already exist, and more are likely to be produced in the near future. Many of the best were selected for inclusion in the Toolkit in quantities for distribution to residents. New fact sheets are likely to be needed on: defensible space, air quality regulations, the use of prescribed burns or other tools to manage fire-dependent natural areas and protect property, and Florida regulations for conducting a prescribed burn.

### Press Kit

The Toolkit includes a computer disk of model press releases and newspaper articles that can be modified for the local situation. Press releases will announce public programs and encourage the media to attend nearby prescribed burns. A model "Dear neighbor" letter is included as an example of how county teams can alert landowners to an upcoming prescribed burn.

### Roadside Interpretive Signs

Division of Forestry representatives will be alerted to identify recent or upcoming prescribed burns near well-traveled roads using roadside interpretive signs. These sites may make ideal demonstration areas. With landowner approval, signs will be erected on these properties to remind the public when and why they were intentionally burned.

### Demonstration Areas

Volusia County Fire Service is creating a demonstration area and pilot-testing the educational materials and methods for contacting media. The Nature Conservancy staff coordinates this opportunity and works with Volusia County to use this information in the Training Workshops. This area will be used to model a process by which county teams will select their own demonstration areas, invite local press to prescribed burns, and erect interpretive signage to increase public awareness at these sites.

### Evaluation Components

Evaluation was conducted throughout this project. A needs assessment provided key information for the materials development process and helped form a baseline for knowledge and awareness for our summative evaluation. Questionnaires are developed and will be distributed before and after each training workshop to assess changes in knowledge and behavioral intentions of participating county teams resulting from the training program. Citizens attending county programs complete surveys immediately

before and three months after the workshop to identify changes in their knowledge, attitudes, and intentions regarding fire-dependent ecosystems, benefits of fire, prescribed burning, and appropriate citizen actions. Post-program phone surveys will continue to be used to assess the impact of the various distribution systems by recording sources of information (public programs, brochures, news media coverage, and demonstration area signs), and their rankings of interest and effectiveness.

County teams will record measurement of program success including: records of the number of public workshops and special programs conducted, mass media press releases and articles submitted and published, number of people contacted through workshops, number of materials distributed, number of prescribed fire messages piggybacked on other programs, and phone calls and personal contacts. An assessment of these initiatives will help identify cost effective and efficient activities for the future.

The "Wildland Fire Education Toolkit Handbook" (Monroe et al., 1999) was published as Circular 1245, University of Florida, Florida Cooperative Extension Service. This work is complemented by a number of Extension fact sheets of fire in Florida (http://edis.ifas.ufl.edu).

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## Flames of Controversy: Interpreting the Yellowstone Fires of 1988

Naturally caused fires have occurred in the Yellowstone area for as long as there has been vegetation to burn. Ecologically, fire, climate, erosion, and a vast assortment of life forms ranging from microbes to insects to mammals, including humans, have all played roles in the creation of Yellowstone's vegetative landscape. Ecologists have known for many years that wildland fire is essential to the evolution of this natural setting. Recent data have revealed that on the park's northern range, major fires historically occurred one to four times a century; in the rest of the park's subalpine forests, the intervals between major fires ranged from 200 to 400 years.

Following Yellowstone's establishment as the world's first national park in 1872, all fires were suppressed regardless of origin or location, a practice that was common for decades. It wasn't until the 1960s and 70s that scientists and resource managers began to understand the role that natural fire plays in Yellowstone. At this point, lightning-caused fires in Yellowstone's vast wilderness were allowed to burn. Most of these fires were extinguished by rain or simply burned themselves out at natural firebreaks such as rivers and canyons.

However, in 1988, Yellowstone's fire season grew to the scale of those infrequent but massive fires recorded in the rings of ancient trees. Several individual fires grew into one huge conflagration that became the largest in the park's recorded history and is now considered one of the most important events to have taken place in the National Park System. That year almost no rainfall was recorded during the months of June, July, and August. As would normally occur, several small fires were started by lightning. However, a series of unusually high winds, associated with dry weather fronts, fanned these fires into a wall of flames that moved with great speed and intensity. By the last week of September, over $120,000,000 had been spent in control efforts. More than 9,000 firefighters (including Army and Marine units), more than 100 fire engines, and dozens of helicopters from many states had participated in the largest firefighting effort ever undertaken in the United States. Within Yellowstone's boundary, 793,880 acres or 36 percent of the park's total acreage was affected to one extent or another by fire (although it is important to note that these figures do not represent total devastation within the perimeter of the burned area).

The Yellowstone fires (which actually encompassed lands beyond park boundaries) received more national attention than any other event in the history of the National Park Service. Unfortunately, many of the media reports were inaccurate or misleading, and no topic caused more confusion in the public's mind than the actual extent of the fires. Reports often oversimplified events or failed to convey the complexity of what was happening at any given moment. Public reaction was intense and often hostile. The fires were fought both on the front lines and on phone lines, as park offices were swamped with calls from concerned visitors, people offering to help, and people with a wide range of ideas about how to put out the fires. As the first winter snowfall finally put out the last fire, park interpretive staff faced the enormous challenge of explaining just what had happened. Looming as well was the prospect of interpreting post-fire research, as several dozen monitoring and scientific projects began almost immediately.

Underlying these challenges were widespread cultural attitudes toward fire and an almost primal-level emotional response to the television-generated images of burning forests. People have been taught that fire is always bad, and the "Smokey Bear"

campaigns initiated in the 1950s and still used today have effectively reinforced these attitudes. Because the science of wildland fires had not previously been covered to any great extent in either print or electronic media, it was vital to distinguish between fires affecting human development, fires started by careless humans, and the role played by naturally caused fires in wilderness settings. It was one thing to appeal to people on an intellectual level, and quite another to deal with the overwhelming emotions of many park lovers who thought that Yellowstone had been destroyed forever.

During the winter and spring months of 1988–89, options for interpreting the fires of 1988 were quickly evaluated with regard to cost, developmental timelines, and effectiveness in reaching a wide and diverse audience both inside and outside the park. Though many projects or programs held great potential, time and sheer workload forced quick decisions. Dozens of ideas for exhibits, publications, and special interpretive programs were quickly narrowed down to a workable few, and staff proceeded on compressed timelines to get as many of these projects as possible completed for the visitor season of 1989.

#### *Visitor Center Exhibit at Grant Village*

Because visitor centers are focal points for visitor contacts in Yellowstone, a major exhibit at one park facility was needed. The logical location was the Grant Village Visitor Center, which at the time contained no permanent exhibits. With the assistance of exhibit planners and designers from the National Park Service's Interpretive Design Center at Harpers Ferry, West Virginia, exhibits incorporating objects from firefighting efforts as well as interactive displays were developed and installed by early July 1989. This facility became the focal point where visitors received the most comprehensive overview of what had happened during the fires of 1988. One year later, a film about the fires was added to the visitor center's media, completing the project.

### Roadside Interpretation

Evidence of fire activity was visible (and remains visible today) from many park roads. A quick survey of conditions revealed that seven locations throughout the park demonstrated key aspects of fire behavior and post-fire ecological succession. These locations were targeted for wayside exhibit units, which were developed by park staff and installed by June 1989. This site-specific interpretation reached a broad spectrum of visitors and was an important method of providing immediate information. These exhibits were also designed to enhance the information provided in the special park newspaper supplement, described below.

### Publications

A special full-color, four-page newspaper supplement was developed by interpretive specialists and distributed along with the basic park newspaper at all five entrances to Yellowstone. This publication offered succinct, easily read accounts of the history of fire in Yellowstone's ecosystems, an overview of the events of 1988, a summary of the most asked questions about the fires with answers updated as new information was received, and a look at the future of Yellowstone's forests, landscape, and wildlife. It proved so popular that revised editions were produced for the 1990 and 1991 seasons, and nearly a quarter million supplements were mailed out in response to written and phone inquiries. Ten years later, in 1998, another supplement was produced to update readers on post-fire research and changes in fire management policy.

A full-color brochure on fire's role in the ecology of the Northern Rockies was also produced and distributed by NPS units, several U.S. Forest Service offices, and a variety of state and local agencies.

### Self-guiding Nature Trail

A new, fully accessible self-guiding nature trail was developed along the northern road corridor of Yellowstone in an area featuring a variety of vegetation types and different degrees of fire effects. Built with a combination of donations from individuals, schools, and corporations as well as park funds, its initial purpose was to provide children and families with an interactive experience in which to learn about fire's role in the park ecosystem. The trail is periodically updated to reflect new research data and further expand its focus in the entire ecosystem.

## Interpretive "Fire Team"

By November of 1988, a team of three interpreters was assembled to develop illustrated programs about the fires for presentation to community groups throughout the region. Requests for such talks had already been received, but once they announced their availability they were in great demand. As might be expected, they encountered widely mixed opinions and reactions to their presentations. Communities in the region had experienced the fires more intimately than anywhere else in the country, and had also been exposed to the most intense and extended coverage of events. Consequently, opinions in support of or in opposition to park fire management policies were often at one end of the spectrum or the other.

Perhaps most importantly, visitors, neighbors, and the general public came to understand what had happened in Yellowstone in their own unique ways. Interpretation provided an important framework for the exchange of reactions, emotions, and ideas. However, only the passing of time and the fact that park visitation not only has not plummeted but set new records, eased fears and allowed people to see for themselves that Yellowstone has survived—and thrives.

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## Alaska and Fire

Alaska is a vast state, with the majority of its land managed by federal and state agencies. Much of this land is wild, inaccessible, and remote. Beyond the largest cities of Anchorage, Fairbanks, and Juneau are many small communities. Some of these communities have fewer than 100 people and are only accessible by small plane or boat. The residents of these small communities are primarily Native Alaskans, many of whom speak their Native language first, English second (if at all). The economies of most of these villages are based on a rural lifestyle and traditional subsistence uses of the land and wildlife. Often there is no grocery store other than a mini-mart type facility, and villagers rely to a substantial extent on what is available to hunt, fish, or gather from the surrounding wildlands for sustenance. Life has been like this for generations.

Lightning-caused fires are an important natural component of boreal forest and tundra ecosystems, which comprise most of the land base in interior and northern Alaska. In southcentral Alaska, where lightning occurrence and lightning-caused fires are much less prevalent, human-caused fires are common, in large part because of the population concentrated there along the road system and the high degree of recreational use. Ecologically, lightning-caused fires help to cycle nutrients, warm soil, sustain a mosaic of varied vegetation age classes and types, and most important from a U.S. Fish and Wildlife Service (USFWS) standpoint, provide a diversity of habitat for wildlife. In 1980 the Alaska National Interest Lands Conservation Act (ANILCA) quadrupled the size of the National Wildlife Refuge System. The sixteen National Wildlife Refuges in Alaska now total over 82 million acres, which is about 90 percent of the acreage of the entire National Wildlife Refuge System. One of the purposes for which refuges in Alaska were created or expanded as a result of ANILCA was to provide for subsistence opportunities for rural residents. Because of the links between fire effects on plants and animals and subsistence opportunities for rural residents, it is important to nurture public support for and understanding of fire management policies.

In part because of the substantial land management changes which resulted from ANILCA and the varied views of the role of fire by the various land managers, the Alaska Interagency Fire Management Plans were developed during the 1980s. These plans provided a mechanism for managing wildland fire on a landscape scale by delineating a range of suppression responses that could systematically be applied across ownership boundaries which balanced costs with resources to be protected and accommodated land management objectives.

The 1988 fire season in Alaska was the most severe in several decades. In fact, the 46 fires that burned on Yukon Flats National Wildlife Refuge that year impacted 1.15 million acres — almost as much acreage as was impacted by the Yellowstone fires. Fires typically burn hundreds of thousands of acres in Alaska each year. Although publicity of the fires in the Yellowstone area greatly overshadowed publicity of the fires that occurred in Alaska in 1988, there was localized negative publicity about the 1988 fire season in Alaska. It was evident that there were a lot of misconceptions, misinformation, misunderstandings, and a wide spectrum of opinions lurking in the public sector about how fires were managed in Alaska and the ecological effects of fire. A group of U.S. Fish and Wildlife employees met to brainstorm how to more effectively provide information to the public on the role of fire on National Wildlife Refuges in Alaska and to identify specific target groups for that information. This group consisted of Refuge Fire Management Officers and Education Specialists. It was decided that it would be most effective to target educators and students in villages within or adjacent to the National Wildlife

Refuges as the primary audiences. The students could pass what they had learned on to their parents, and the students could carry their knowledge and understanding forward as they developed into adults to make informed decisions in their villages when fire management issues arose. The group also recognized that it would be useful to provide media professionals reporting with appropriate background information. The theme of the educational activities and the focus of the background information would be the natural role of fire in boreal forest and tundra ecosystems in Alaska and how the U.S. Fish and Wildlife Service managed and utilized fire in that context.

## The Curriculum "Role of Fire in Alaska"

After the group brainstormed a framework of activities and content ideas, a contract was proposed and awarded for preparation of a K–12 "Role of Fire in Alaska" curriculum with an accompanying poster. In addition, several products were also developed to aid and encourage teachers to utilize the curriculum. Teachers in rural Alaska can have difficulty obtaining resource materials for teaching. Teachers are also very busy and like to have materials and lesson plans that can be used "off the shelf." The group decided one of the products to be developed would be a "kit" in a plastic storage container which would include all the materials and supplies required to do many of the activities from the curriculum. A slide presentation and tabletop display were also developed. Development of these materials took two to three years. Prior to completion of the curriculum, piloting was done to make sure the product was on target. A few years after the curriculum was completed, a "Fire in the Forest" video taking students on an investigative field trip to a burned area was developed for use in villages or towns where it was not convenient to visit a burned area firsthand.

It is one thing to develop educational materials, but quite another to generate enough interest and incentives for rural teachers to use them. U.S. Fish and Wildlife Service Education Specialists and trained refuge employees facilitated workshops and credit courses for teachers in communities interested in the curriculum. These workshops were provided for rural schools at no cost to teachers other than for the college credit. Each teacher participating was given a full set of curriculum materials and often a "kit" was loaned to the school. Offering a credit was attractive to teachers who had to recertify with new credits every 5 years.

As the use of the curriculum in Alaska was implemented, strengths and weaknesses became apparent. One of the strengths was that the curriculum was Alaska-specific. Alaskan teachers at that time had little else to choose from for Alaska-specific curricula. They loved the fact that the curriculum contained accurate tundra and boreal forest ecological material. The curriculum was used most effectively by upper elementary and older students. To understand fire ecology and fire management, students needed to have a basic boreal forest or tundra ecology foundation. The curriculum was weak in providing this foundation. As a result, we began to do joint credit courses with the Project Learning Tree coordinator in Alaska. The Project Learning Tree national curriculum does a masterful job with forest ecology in this regard. In addition, several years after our curriculum was produced, the Alaska Department of Fish and Game produced an excellent curriculum called "Alaska's Forests and Wildlife." We now encourage educators to take advantage of these two curricula to supplement the "Role of Fire" curriculum.

Initially, the "Role of Fire" curriculum was available free to any teacher who attended the workshop or credit course, similar to requirements for Project WILD and Project Learning Tree. We discovered several problems with this arrangement. Too much of our time was being spent receiving phone calls and filling orders, time which could be

used more productively instructing teachers. Rural locations in Alaska can be expensive to get to and time-consuming places to hold for workshops. Weather can cause delays getting to workshop locations as well as delays in leaving workshop locations. In addition, teachers in rural Alaska turn over very quickly. At some locations, training would be provided, only to have 100 percent turnover the next year and a total loss of trained teachers to utilize the curriculum.

As far as distribution was concerned, we decided to contract with a business who would be willing to sell our curriculum. We wanted the curricula to reach teachers, whether we gave a teacher workshop or not. The contractor is required to advertise and fill retail and wholesale orders, especially in rural Alaska. The contractor is given the curricula, sells it at a standard book markup, and then must bear the financial burden of reprinting it. The U.S. Fish and Wildlife Service will revise the curriculum for reprinting. An important addition will be identification of how state science standards are met for each activity. Recent developments such as revised federal policies, new terminology, and wildland-urban interface issues will also be incorporated.

## The Media Guide

During the Yukon Flats fires in 1988, it became clear that print and TV reporters did not usually have the appropriate background information to put the event in an ecological context. The "Role of Fire" curriculum was developed with a section at the back containing fire ecology background information. The background section was written with both teachers and the media in mind. A cover was designed for a small binder to package the background material for the media. Piggybacking the production of this binder with the curriculum was very economical. These guides were distributed to the major television, radio, and newspaper reporters in Alaska as well as to Refuge Managers.

## The Fire Inquirer

The USFWS wanted to reach the parents of school children with fire ecology information directly as well as through the children. Rather than relying solely on the students to talk to their parents about what they had studied at school, the *Fire Inquirer* was developed. In rural Alaska a newspaper called *Bush Mailer* is delivered to every post office box owner once each week. This newspaper is the only paper residents of some rural villages receive. It was decided the *Fire Inquirer* would be an insert to this newspaper.

This eight-page insert was filled with fun fire ecology and fire management related activities for kids, and also with sufficient graphics and content to make it interesting for adults to notice and read. This insert was timed to arrive in the spring, just prior to the beginning of fire season.

## Conclusion

In 1996, a human-caused fire occurred 20 miles (about 32 kilometers) north of Anchorage in which over 300 homes were destroyed. It painfully underscored the wildland-urban interface fire problem that was developing in Alaska. As the result of publicity from that event, Alaskans in rural and urban areas are now even more primed for education about fire management and fire ecology. In concert with other state and federal agencies through the Alaska Wildland Fire Coordinating Group, the USFWS will continue efforts to increase public awareness and understanding of the role of fire in Alaska and current fire management challenges facing federal, state, local agencies, and private landowners.

## For More Information:

Cathy Rezabeck
U.S. Fish and Wildlife Service
1011 E. Tudor Rd.
Anchorage, AK 99503

## Seeking Wildland Fire Information on the Internet

The Internet is exploding with information available via the World Wide Web on the topics of wildland fire and fire ecology. Locating the information can be somewhat overwhelming. Learning to use the different search engines available is critical to locating the desired information in a reasonable amount of time. Keep in mind that sites and even addresses are constantly changing.

Practicing with and trying the various search tools will render some useful sites. Assistance can be found as each search engine provides its own "help" files. Examples of some of the more popular search engines and their addresses are:
*AltaVista* at http://altavista.com and
*Excite* at http://www.excite.com. There are also metasearch engines that combine the results of multiple search engines; an example is *MetaCrawler* at http://www.metacrawler.com. New search engines are regularly being added.

Spending time with some of the teaching tools available can be extremely helpful. For example, the Ohio State University Libraries has a teaching tool called *net*. *Tutor* that is very good in guiding the novice and experienced user through the use of search tools on the Web; *net*. *Tutor* can be found at http://gateway.lib.ohio-state.edu/tutor. The University of California (Berkeley) also has a set of workshops on searching the Internet through their Teaching Library Internet Workshop; their address is http://www.lib.berkeley.edu/TeachingLib/Guides/Internet.

Search tools permit searching for phrases such as "wildland fire" but this phrase is very broad and will return many possibilities. This phrase can be narrowed by search within a group for a more specific area—i.e., "grasslands"—which will narrow the search. The search engines do not necessarily reference the same databases and it may be helpful to use multiple search engines to locate the numerous available sources. In addition, looking for phrases rather than common terms, along with the constraints provided by the search tool will improve the precision of the results. Searching in ways that return relevant information is an art one develops when searching the Web.

The United States, Canada, and Australia have the most sources for "wildland fire" listed in all the databases. A number of universities and federal and state government agencies have taken the responsibility of entering data and making it available on the Internet. Information on the Web concerning "wildland fire" from other parts of the world is relatively scarce.

The Web is very fluid and unless a source is known to be reliable, such as a federal government or a state/provincial government agency that has responsibility to maintain the site, it may not be there the next time you reference it or it may never be updated.

The World Wide Web is a revolution in information retrieval. Some of the information has existed in libraries but the advent of the Web and the search engines permit the information to be readily available to more people in all corners of the world. The following are a few examples of web sites among many:

**Education World**
http://www.education-world.com/a_lesson/lesson026.shtml

Lesson Plans Fire Safety: Activities to Spark Learning! A firehouse full of cross-curriculum activities and fire-related Internet sites for Fire Prevention Week.

**Federal Emergency Management Agency**
http://www.fema.gov
The Federal Emergency Management Agency (FEMA) is an independent agency of the federal government. FEMA's mission is to reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response, and recovery.

**Federal Wildland Fire Service Association**
http://www.fwfsa.org
P.O. Box 2232, Nevada City, CA 95959;
(916) 274-1159
FWFSA is a nonprofit, nonpartisan professional association established by and for federal wildland firefighters with the purpose of fostering acquaintance, cooperation, efficiency, and harmony amongst all firefighters.

**FireNet**
http://www.anu.edu.au/Forestry/fire/firenet.html
FireNet is an on-line information service for everyone interested in rural and landscape fires. The information concerns all aspects of fire science and management including fire behavior, fire weather, fire prevention, mitigation and suppression, plant and animal responses to fire, and other aspects of fire effects.

**FireSafe**
http://firesafe.org/usa.html
FireSafe is the home page/resource directory for safety information. It offers web site and document hosting to agencies and nonprofit organizations. Fire, police, and marine safety/lifeguard agencies are included along with seasonal safety information. Public and private agencies, associations, and suppliers are welcome. Send e-mail to: firesafe@firesafe.org

**Firewise**
http://www.firewise.org
The Firewise homepage was created for people who live, vacation, or own vacation homes in fire prone areas of North America. The information contained here will enable the user to become a Firewise individual. These pages provide information that may lessen the result of wildland fire loss for you, your family, and your neighbors. The user will find on-line wildland fire protection information designed to help them avoid unnecessary fire loss. There is also a list of off-line wildland fire protection information as well as links to off-site fire resources.

**Forest History Society**
http://www.lib.duke.edu/forest/index.html
The Forest History Society links the past to the future by identifying, collecting, preserving, interpreting, and disseminating information on the history of interactions among people, forests, and their related resources—timber, water, soil, forage, fish and wildlife, recreation, and scenic or spiritual values. The focus is from a North American perspective within a global context. Established in 1946 and incorporated as a nonprofit educational institution in 1955, the Forest History Society has grown steadily in response to increasing public concern about our forest heritage. It is affiliated with Duke University.

**Global FIREnet**
http://www.umt.edu/globalfirenet
Global FIREnet provides a place to meet and share the latest developments and technologies. This site is user friendly and provides valuable links to other fire-related sites around the world. Plus, it is the only on-line Fire Net News Service available, and it is free. The Global FIREnet web site is managed by the University of Montana's Center for Continuing Education. The business and affairs of the organization are governed by a volunteer Steering Committee consisting of researchers and fire/fuels management professionals.

**Index to Wildland Fire WWW Catalog**
http://www.blm.gov/narsc/wildfire/wwwindex.html
An alphabetical listing of wildland fire sites on the Internet.

**Interface Zone Resource Center**
http://www.neotecinc.com/izone/index.html

The I-Zone Resource Center is for firefighters and homeowners. It is intended to help keep users informed of the latest issues surrounding wildland/urban interface firefighting and protection. It provides a place to discuss with fire professionals and experienced veterans of wildland/urban interface fires the I-Zone subjects of concern, and provides information on the latest training available.

**Interagency Fire Education Initiative**
http://fire.nifc.nps.gov/fire/ecology/docs/ecolinit.html
The primary goal of this fire ecology packet is to help teachers and students become better informed about land management issues and the responsibilities of natural resource management agencies.

**International Society of Fire Service Instructors (ISFSI)**
http://www.isfsi.org
The International Society of Fire Service Instructors (ISFSI) is renowned for the training and educational programs provided for instructors and training personnel in the fire and emergency response community. The Society assists in developing the educational and training skills that are critical to the fire, life safety, and emergency response community.

**Line of Fire (Discovery Channel)**
http://www.discovery.com/area/science/wildfires/weblinks.html

Provides many links to the latest information on wildland fire. Plus, it provides further references off the web that the user can find.

**Michigan Interagency Wildland Fire Protection Association**
http://www.dnr.state.mi.us/www/fmd/fire/miwfpa.htm
Human activity accounts for 95 percent of all wildland fires in Michigan. This startling fact led to the formation of the Michigan Interagency Wildfire Prevention Group in 1981. It was the first such group in the nation promoting wildland fire prevention and awareness that had 100 percent involvement of the state's fire agencies. Group members have made it their goal to educate Michigan's residents about wildland fire safety and the dangers of wildland fires, so it becomes an everyday part of their lives, both in and outside the home.

**National Fire Protection Association**
http://www.nfpa.org
This site contains the latest information about the National Fire Protection Association (NFPA), its departments, publications, seminars, and educational programs. The mission of NFPA, which was organized in 1896, is to reduce the burden of fire on the quality of life by advocating scientifically based consensus codes and standards, research and education for fire, and related safety issues.

**National Interagency Fire Center**
http://www.nifc.gov/
As the coordinating center for all wildland fire activity in the United States, NIFC maintains a comprehensive web site that is well-linked to numerous wildland fire resources.

**Smokey Bear's Homepage**
http://www.smokeybear.com
This web site contains information on the prevention of forest fires. The site is targeted at children by including games that teach about preventing forest fires. The web site also includes an informational resource page, with links to all the governmental agencies for further information.

**U.S. Department of the Interior**
http://www.doi.gov
This site explains the Department of the Interior, but more importantly it links to the agencies within the Department, all with wildland fire management responsibilities.

**USDA Forest Service**
http://www.fs.fed.us
To find specific information on fire, go to the site index that lists a series of topics including: Fire and Aviation Management, Fire Effects Information System, and Wildland Fire Assessment System.

**United States Fire Administration**
http://www.usfa.fema.gov
The United States Fire Administration (USFA) provides national leadership in fire training, data collection, technology, and public education and awareness. USFA supports the efforts of local communities to save lives and reduce injuries and property loss due to fire. This site contains a vast array of topics the user can explore. There is a "kids page" where children can learn about fire safety.

**Wildland Firefighter Magazine**
http://www.wildlandfirefighter.com
The monthly news and information resource for wildland firefighters.

*Author: Rowena Willey*

## Resources

Throughout this guide you will find examples of materials, bibliographic information for printed materials, web-based resources, and similar references. Most references are not repeated in this section. Following are additional sources of wildland fire information for the communicator.

## Education and Outreach

National Wildfire Coordinating Group:
National Interagency Fire Center, Attn: Supply, 3833 S. Development Ave., Boise, ID 83705;
http://www.nwcg.gov/pms/pubs/catalog.htm

- Introduction to Wildfire Prevention. 1997. NFES 3362
- Introduction to Wildland Fire Behavior S-190. 1994. NFES 1860
- Strategic Communications for Wildland Fire Management: Discussion Guide. 1992. NFES 2253
- Wildfire Prevention: Conducting School Programs Guide. 1996. NFES 1254
- Wildfire Prevention: Event Management Guide. 1996. NFES 1253
- Wildfire Prevention: Marketing Guide. 1996. NFES 1252
- Wildfire Prevention and the Media. 1998. NFES 1877
- Wildfire Prevention Strategies Guide. 1998. NFES 1572
- Wildland Fire Prevention Planning. 1998. NFES 3362

National Interagency Fire Center. Educational material on-line at http://www.nifc.gov./preved/index.html. Extensive list and ordering information for "Smokey Bear," "Woodsy Owl," and "Fire Education" materials.

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Fire Prevention and Public Fire Education. 1993. Vancouver, WA: Action Training Systems, Inc.

National Wildfire Coordinating Group:
National Interagency Fire Center, Attn: Supply, 3833 S. Development Ave., Boise, ID 83705;
http://www.nwcg.gov/pms/pubs/catalog.htm

- Building a Firewise Home. 1997. NFES 2533
- Creating Fire Resistant Environments. 1989. NFES 2128
- Developing a Cooperative Approach to Wildfire Protection. 1997. NFES 1271
- Everyone's Responsibility: Fire Protection in the Wildland/Urban Interface. 1994. NFES 1900.
- Firewise Landscaping. 1993. Video Series. NFES 2411
- Firewise Landscaping, Part I: Overview. NFES 2412
- Firewise Landscaping, Part II: Design and Installation. NFES 2413
- Firewise Landscaping III: Maintenance. NFES 2414
- Firewise Landscaping III: Maintenance, SPANISH
- Focus on Wildfire Prevention: Profiling Four Programs that Really Work. 1993. NFES 2376
- Making Your Home Firewise. 1997. NFES 2534
- The Meeting: Fire Protection Planning in the Wildland/Urban Interface. 1991. NFES 2186
- One Step Beyond. 1996. NFES 2509.

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A Legacy of Wildfires. 1990. Rochester, NY: Wards Natural Science Establishment, Inc.

Living on the Edge: Fire and the Urban Interface. 1996. USDA Forest Service. Washington, DC.

Raging Planet: Fire. 1998. Discovery Channel Video. Item #713883. Call 1-800-475-6636.

Sea of Green: The Story of the Tillamook State Forest. 1996. USDA Forest Service. San Diego, CA: Odyssey Productions, Inc.

Sesame Street Home Video Visits the Firehouse/Children's Television Workshop. 1990. [United States]: Random House Home Video. ISBN: 0679808205

Two Sides of Fire. 1996. Temperate Forest Foundation. 14780 SW Osprey Dr., Suite 355, Beaverton, OR 97007. Call (503) 579-6762. Sample available on-line at http:www.forestinfo.org/Products/videos.htm.

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National Wildfire Coordinating Group:
National Interagency Fire Center, Attn: Supply, 3833 S. Development Avenue, Boise, ID 83705;
http://www.nwcg.gov/pms/pubs/catalog.htm

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- Prescribed Fire in Resource Management. 1990. NFES 2100
- Prescribed Fire Smoke Management Guide. 1985. NFES 1279
- Protecting Your Home from Wildfire. 1989. NFES 2076

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## Wildland Fire Resources On-line

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- Bombardier Aerospace – Amphibious Aircraft — http://www.aerospace.bombardier.com/
- British Columbia Ministry of Forests — http://www.gov.bc.ca/for/
- British Fire Service — http://www.fire.org.uk/
- Bureau of Indian Affairs — http://www.doi.gov/bureau-indian-affairs.html
- Bureau of Land Management — http://www.blm.gov
- Canadian Interagency Forest Fire Centre (CIFFC) — http://www.ciffc.ca/cif.htm
- Canadian Wildfire Network — http://www.denendeh.com/flycolor/wildfire/index.htm
- Canadian Wildland Fire Information System — http://www.nofc.forestry.ca/fire/cwfis
- Discovery Channel School — http://discoveryschool.com
- Fire Ecology Database — Tall Timbers Research Station — http://www.talltimbers.org/feco.html
- Fire Fighting.com — http://firefighting.com/
- Fire Information Now Database — United States Fire Administration/FEMA — http://www.usfa.fema.gov/find/ (urban fire emphasis)
- Fire Management Today — http://www.fs.fed.us/fire/planning/firenote.htm
- Fire Research Network — Natural Resources Canada, Canadian Forest Service — http://www.nofc.forestry.ca/fire/frn/index.htm
- Florida Division of Forestry — Bureau of Forest Protection — http://flame.fl-dof.com/
- Fire Scout — http://www.eskimo.com/~jolem/fire/
- FireNet (International Fire Information Network) — http://online.anu.edu.au/Forestry/fire/firenet.htm or http://www.csu.edu.au/firenet/firenet.html
- FireSafe — http://firesafe.org
- FireWise — http://www.firewise.org
- Index to wildland fire WWW catalog — http://www.blm.gov/narsc/wildfire/wwwindex.html
- International Association of Wildland Fire Catalog — http://www.wildfiremagazine.com/bookstor.shtml
- NASA — Earth Observatory — Global Fire Monitoring — http://earthobservatory.nasa.gov/Library/GlobalFire/fire.html
- National Fire Fighter Corp. — http://www.nationalfirefighter.com/ (equipment source)
- National Fire Protection Association (NFPA) — http://www.nfpa.org/
- National Interagency Fire Center (NIFC) — http://www.nifc.gov/
- National Park Service — http://www.nps.gov
- National Wildfire Coordinating Group (NWCG) — http://www.nwcg.gov/
- New South Wales National Parks and Wildlife Service — http://www.npws.nsw.gov.au/wildlife/fire.htm
- New Zealand National Rural Fire Authority — http://www.fireserv.org.nz/ruralonramp/index.htm
- Northern Prairie Publications Database — Northern Prairie Wildlife Research Centerv — http://www.npwrc.usgs.gov/npscpubs/npscpubs.htm and http://www.npwrc.usgs.gov/resource/resource.htm

- Parks Canada — Fire in Canada's National Parks — http://parkscanada.pch.gc.ca/library/Fire/Fire_e.htm
- Smokey Bear's Official Homepage — http://www.smokeybear.com/
- Southwest Area Wildland Fire Operations — http://www.fs.fed.us/r3/fire/ (add all the other regions)
- Sparky the Firedog's Homepage — http://www.sparky.org
- Tall Timbers Research Station — http://www.ttrs.org/
- Tall Timbers Research Station Fire Ecology Database — http://www.talltimbers.org/feco.html
- The International Association of Wildland Fire — http://www.wildfiremagazine.com/
- The Nature Conservancy — National Fire Management Program — http://www.tncfire.org/
- U.S. Fish and Wildlife Service — http://www.fws.gov
- U.S. Fish and Wildlife Service — Fire Management — http://fire.fws.gov/
- USDA Forest Service — Fire and Aviation — http://www.fs.fed.us/fire/
- USDA Forest Service — Fire Effects Information System — http://www.fs.fed.us/database/feis/
- USDA Forest Service — http://www.fs.fed.us
- USGS Wildland Fire Research — http://www.usgs.gov/themes/Wildfire/fire.html
- Wildland Firefighter Magazine — http://www.wildlandfirefighter.com/
- Natural Resources Canada, Fire Research Network — http://www.nofc.forestry.ca/fire/frn/index.htm
- Temperate Forest Foundation — http://www.forestinfo.org/

## Acknowledgments

The following are acknowledged for their contribution to making the document possible:

Laura Anderson, The Ohio State University
Maureen Brooks, Maryland Forest Service
David Bunnell, USDA Forest Service
Thea Cesner, The Ohio State University
Diane Chalfant, USDI National Park Service
Kevin Clute, The Ohio State University
Jeffery Corney, The Ohio State University
Jeffery Danter, The Nature Conservancy
Pat Durland, USDI Bureau of Land Management
Rosanne Fortner, The Ohio State University
Elizabeth Hall, The Ohio State University
Robert Huggins, USDI National Park Service
Mary Jacobs, The Ohio State University
Colleen Labbe, The Ohio State University
Michelle Mazzei-Cox, The Ohio State University
Martha Monroe, University of Florida
Gary Mullins, The Ohio State University
Pat Patterson, The Ohio State University
Betsy Poeppelman, The Ohio State University
Cathy Rezabeck, USDI Fish & Wildlife Service
Bill Terry, USDA Forest Service
Bob Valen, USDI National Park Service
Rowena Willey, The Ohio State University
Kate Wiltz, The Ohio State University
Linda Young, USDI National Park Service
Gina Zwerling, The Ohio State University

The numerous other individuals, companies, and organizations listed throughout the document are also recognized for their contributions to wildland fire literature and to making this document possible.